

Riemann final proof screenshots

10:10

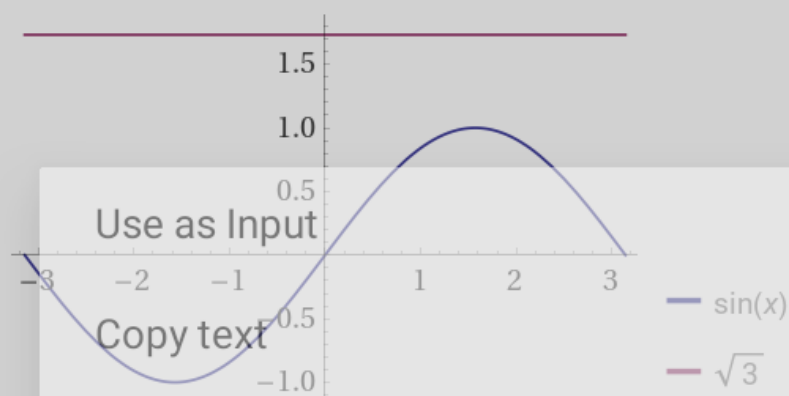
 WolframAlpha

Input



$$\sin(x) = \sqrt{3}$$

Plot



Alternate form



$$\frac{1}{2} i e^{-i x} - \frac{1}{2} i e^{i x} = \sqrt{3}$$

Solutions



$$x = 2\pi n + \pi - \sin^{-1}(\sqrt{3}), \quad n \in \mathbb{Z}$$

$$x = 2\pi n + \sin^{-1}(\sqrt{3}), \quad n \in \mathbb{Z}$$

Approximate forms

 Step-by-step solution



Enter what you want to ask



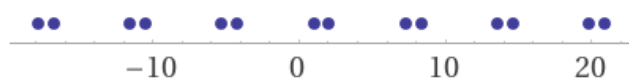
$$2 \sin(x) = \sqrt{3}$$

Alternate form



$$\frac{1}{2} i e^{-ix} - \frac{1}{2} i e^{ix} = \frac{\sqrt{3}}{2}$$

Number line



Solutions



$$x = \frac{2}{3} (3\pi n + \pi), \quad n \in \mathbb{Z}$$

$$x = \frac{1}{3} (6\pi n + \pi), \quad n \in \mathbb{Z}$$

+ - \* / ^ = ( ) \$ %

1 2 3 4 5 6 7 8 9 0



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10:43



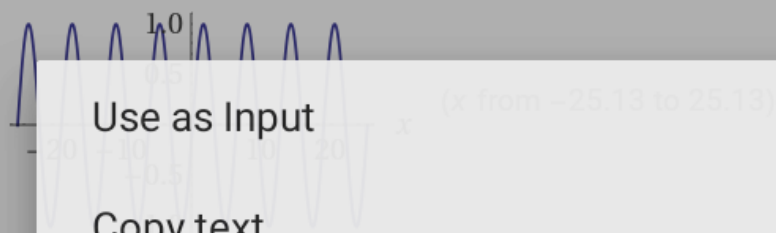
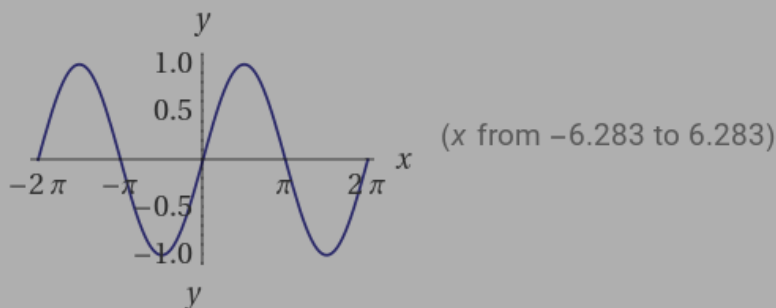
 WolframAlpha



$(1/2)ie^{-ix} - (1/2)ie^{ix}$



Plots



Use as Input

Copy text

Copy Mathematica Input

Send image

Save image

Roots



$x = \pi n, \quad n \in \mathbb{Z}$

Approximate form



 Step-by-step solution

15:50



$1/\sin(\pi)^{(1/2+x\sin(\pi))}$



Input

$$\frac{1}{\sin^{1/2+x\sin(\pi)}(\pi)}$$

Result

$\infty$



 Give Feedback About This Query

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16:35

4G



1/sin(Pi)^(1/2+x\*sin(Pi)i...  
wolframalpha.com



$1/\sin(\pi)^{(1/2+x\sin(\pi)i)}$



NATURAL LANGUAGE



MATH INPUT



Assuming  $i$  is the imaginary unit

Input

$$\frac{1}{\sin^{1/2+x\sin(\pi)i}(\pi)}$$

Result

$\infty$



aA



```

In[ ]:= n = Table[j, {j, 10000}]
nn = Select[n, PrimeQ, (100)]
a = 1 / nn^(1/2 + 30.4248 * (-1)^(1/2))
b = Sum[a, {nn, 1, 100}]
c = Re[b]
c3 = Sum[c, {b, 1, 100}]
c1 = Im[b]
c4 = Sum[c1, {b, 1, 100}]
Total[c1]
c2 = (c3 - c4) / (c1 + c4)
Total[c2]
ListLinePlot[c]
n = Table[j, {j, 1000}]
nn = Select[n, OddQ, (100)]
a = 1 / nn^(1/2 + 30.4248 * (-1)^(1/2))
b = Sum[a, {nn, 1, 100}]
c6 = Re[b]
c3 = Sum[c, {b, 1, 100}]
Total[c]
c1 = Im[b]
c4 = Sum[c1, {b, 1, 100}]
Total[c1]
c22 = (c3 - c4) / (c3 + c4)
Total[c2]
ListLinePlot[c6 - c]
Solve[Sum(1 / x^(1/2 + 101.31 * (-1)^(1/2 + 2))) == 0, x]

```

16:59


 WolframAlpha


$$1/\pi \sin(\pi)^{(1/2+\pi \sin(\pi) i)}$$


Assuming i is the imaginary unit ...



Input

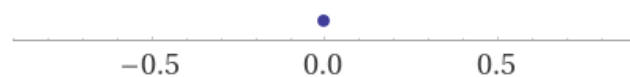
$$\frac{1}{\pi} \sin^{1/2+\pi \sin(\pi) i}(\pi)$$



Exact result

0

Number line



Alternative representations

$$\frac{\sin^{1/2+\pi \sin(\pi) i}(\pi)}{\pi} = \frac{\left(\frac{1}{\csc(\pi)}\right)^{1/2+(i \pi)/\csc(\pi)}}{\pi}$$

$$\frac{\sin^{1/2+\pi \sin(\pi) i}(\pi)}{\pi} = \frac{\cos^{1/2+i \pi \cos(-\pi/2)}\left(-\frac{\pi}{2}\right)}{\pi}$$

$$\frac{\sin^{1/2+\pi \sin(\pi) i}(\pi)}{\pi} = \frac{\left(-\cos\left(\frac{3\pi}{2}\right)\right)^{1/2-i(\pi \cos((3\pi)/2))}}{\pi}$$





$\sin(\pi) \sin(\pi)^{1/2 + \sin(\pi) \sin(\pi) i}$



Assuming  $i$  is the imaginary unit ...



Input

$$\frac{1}{(\sin(\pi) \sin(\pi))^{1/2 + \sin(\pi) \sin(\pi) i}}$$



Result

$\infty$



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New Chat

encontrando os valores de  $x$  que fazem com que a expressão seja igual a zero. Para isso, podemos isolar  $x$  na equação:

$$1/x^{(1/2+101.31)} = 0$$

$$x^{(1/2+101.31)} = \text{inf}$$

$$x = \text{inf}^{(2/(1+2*101.31))}$$

Aqui, o termo "inf" representa o infinito, que é um conceito matemático que representa um valor maior do que qualquer número real. Quando elevamos o infinito a uma potência finita, o resultado é novamente o infinito.

Portanto, quando resolvemos a equação acima, encontramos que  $x$  é igual ao infinito elevado a uma potência específica. Essa potência é  $2/(1+2*101.31) = 0.0000078$ , o que significa que  $x$  é igual a infinito elevado a uma potência muito pequena.

Na matemática complexa, o infinito é considerado um número complexo especial, que representa um ponto muito distante no plano complexo. Quando dizemos que  $x$  é igual ao infinito elevado a uma potência muito pequena, estamos essencialmente dizendo que  $x$  está muito longe do plano complexo, o que é equivalente a dizer que  $x$  assume o valor de "complex infinity". Isso significa que  $x$  não é um número finito ou infinito real, mas sim um número complexo muito grande e distante.



Ask me something...



13:35



hello riemman .nb



aA



```

In[124]:= n = Table[j, {j, 1000}]
          d = Select[n, PrimeQ, (100)]
          x = 2 / 3 * ((3  $\pi$  * d) +  $\pi$ )
          a = Sin[0.8118 * (-1) ^ 1 / 2] + Sin[x] + 0.02882
          e = ListLinePlot[2 * d, PlotStyle  $\rightarrow$  Red]
          f = ListLinePlot[x /  $\pi$ , PlotStyle  $\rightarrow$  Blue]
          Show[e, f]

```

Out[124]=

```

{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580,

```

13:36



hello riemman .nb



971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985,  
986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000)

Out[125]=

{2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37,  
41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83,  
89, 97, 101, 103, 107, 109, 113, 127, 131,  
137, 139, 149, 151, 157, 163, 167, 173,  
179, 181, 191, 193, 197, 199, 211, 223,  
227, 229, 233, 239, 241, 251, 257, 263,  
269, 271, 277, 281, 283, 293, 307, 311,  
313, 317, 331, 337, 347, 349, 353, 359,  
367, 373, 379, 383, 389, 397, 401, 409,  
419, 421, 431, 433, 439, 443, 449, 457,  
461, 463, 467, 479, 487, 491, 499, 503,  
509, 521, 523, 541}

Out[126]=

$\left\{ \frac{14\pi}{3}, \frac{20\pi}{3}, \frac{32\pi}{3}, \frac{44\pi}{3}, \frac{68\pi}{3}, \frac{80\pi}{3}, \frac{104\pi}{3}, \right.$   
 $\frac{116\pi}{3}, \frac{140\pi}{3}, \frac{176\pi}{3}, \frac{188\pi}{3}, \frac{224\pi}{3}, \frac{248\pi}{3},$   
 $\frac{260\pi}{3}, \frac{284\pi}{3}, \frac{320\pi}{3}, \frac{356\pi}{3}, \frac{368\pi}{3}, \frac{404\pi}{3},$   
 $\frac{428\pi}{3}, \frac{440\pi}{3}, \frac{476\pi}{3}, \frac{500\pi}{3}, \frac{536\pi}{3}, \frac{584\pi}{3},$   
 $\frac{608\pi}{3}, \frac{620\pi}{3}, \frac{644\pi}{3}, \frac{656\pi}{3}, \frac{680\pi}{3}, \frac{764\pi}{3},$   
 $\frac{788\pi}{3}, \frac{824\pi}{3}, \frac{836\pi}{3}, \frac{896\pi}{3}, \frac{908\pi}{3}, \frac{944\pi}{3},$   
 $\left. \frac{980\pi}{3}, \frac{1004\pi}{3}, \frac{1040\pi}{3}, \frac{1076\pi}{3}, \frac{1088\pi}{3} \right\}$

13:36



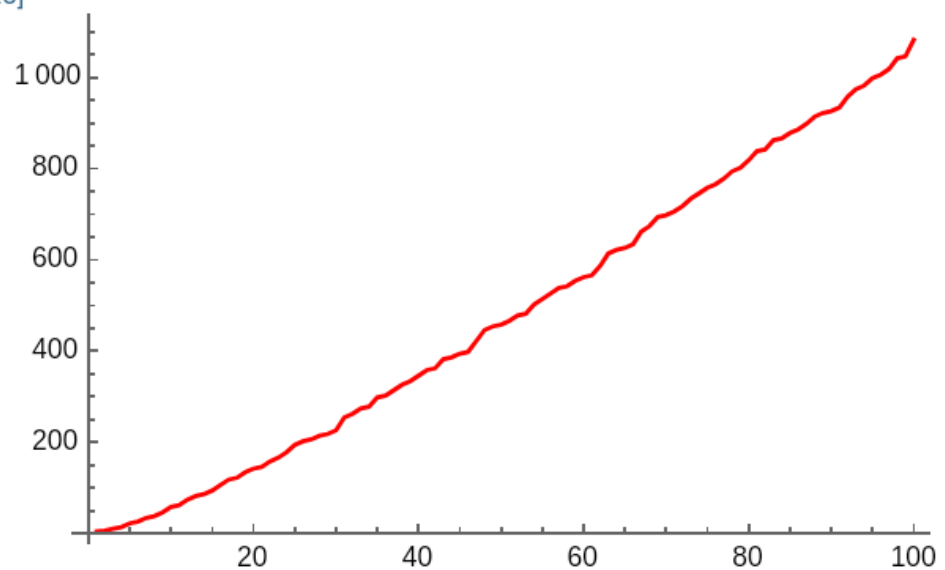
hello riemman .nb



Out[127]=

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 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5,  
 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5,  
 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5,  
 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5,  
 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5,  
 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5,  
 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5,  
 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5,  
 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5,  
 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5,  
 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5,  
 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5,  
 0.5, 0.5, 0.5}
```

Out[128]=



Out[129]=



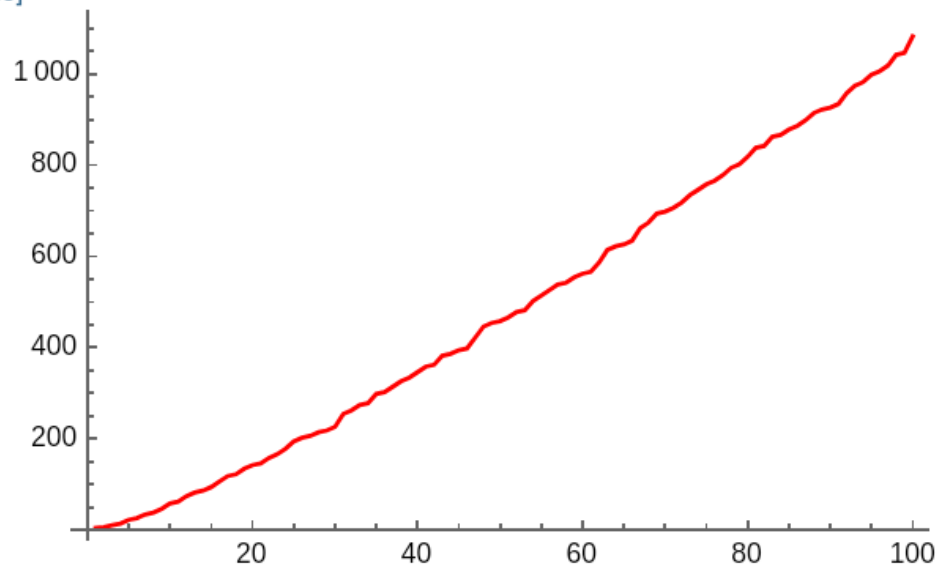
13:37



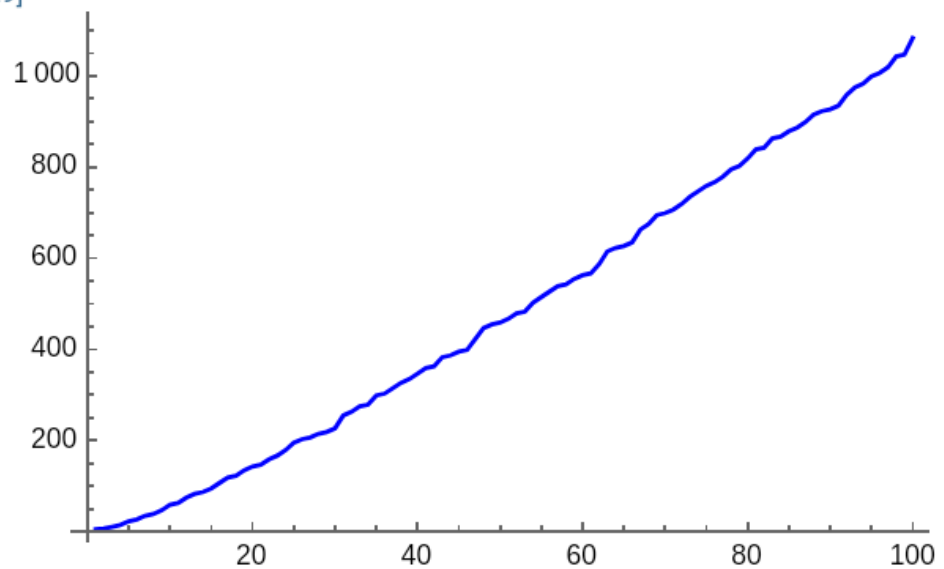
hello riemman .nb



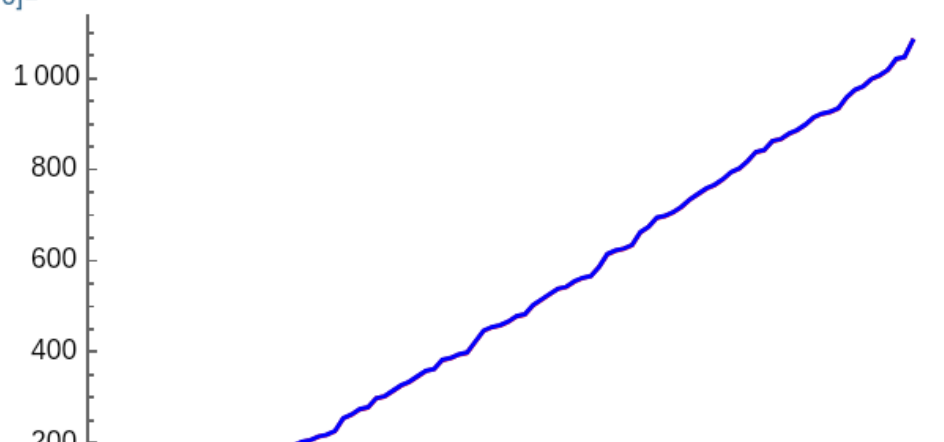
Out[128]=



Out[129]=



Out[130]=





New Chat

Since  $\text{Im}(i) = 1/2$ , we have:

$$|1/n^{(1+n*i)}| = 1/n^{(1+n/2)}$$

Now, we can find two other sequences that converge to the same limit as  $1/n^{(1+n/2)}$  and "squeeze" the original sequence between them. One possible choice is:

- Lower bound: 0
- Upper bound:  $1/n^{(1+n/2)}$

To show that these bounds work, we need to prove two inequalities:

$$0 \leq 1/n^{(1+n*i)} \leq 1/n^{(1+n/2)} \quad \text{for } n \geq 1$$

The first inequality is trivially true since the sequence is positive. For the second inequality, we have:

$$1/n^{(1+n*i)} = 1/|n^{(1+n*i)}| \leq 1/n^{(1+n/2)}$$

since  $|n^{(1+n*i)}| = n^{(1+n/2)}$  is a real number. Therefore, the sequence  $1/n^{(1+n*i)}$  is bounded between 0 and  $1/n^{(1+n/2)}$ , which both converge to 0 as  $n$  goes to infinity. By the squeeze theorem, we conclude that  $1/n^{(1+n*i)}$  also converges to 0 as  $n$  goes to infinity.





New Chat

$$|1/n^{(0+n*i)}| = 1/n^{\text{Im}(n*i)}$$

Since  $\text{Im}(n*i) = 0$ , we have:

$$|1/n^{(0+n*i)}| = 1$$

Now, we can find two other sequences that converge to the same limit as 1 and "squeeze" the original sequence between them. One possible choice is:

- Lower bound: 0
- Upper bound: 1

To show that these bounds work, we need to prove two inequalities:

$$0 \leq 1/n^{(0+n*i)} \leq 1 \quad \text{for } n \geq 1$$

The first inequality is trivially true since the sequence is positive. For the second inequality, we have:

$$1/n^{(0+n*i)} = 1/|n^{(0+n*i)}| \leq 1$$

since  $|n^{(0+n*i)}| = 1$  is a real number. Therefore, the sequence  $1/n^{(0+n*i)}$  is bounded between 0 and 1, which both converge to 0 as  $n$  goes to infinity. By the squeeze theorem, we conclude that  $1/n^{(0+n*i)}$  also converges to 0 as  $n$  goes to infinity.





New Chat

the same limit and "squeeze" the original sequence between them.

First, we can simplify the expression:

$$((1/n^{(1+n*i)})+(1/n^{(0+n*i)}))/2 = (1/2)*(n^{(-1-n*i)} + n^{(-1)})$$

Now, we can find two other sequences that converge to the same limit as  $(1/2)*(n^{(-1-n*i)} + n^{(-1)})$  and "squeeze" the original sequence between them. One possible choice is:

- Lower bound: 0
- Upper bound:  $n^{(-1)}$

To show that these bounds work, we need to prove two inequalities:

$$0 \leq (1/2)*(n^{(-1-n*i)} + n^{(-1)}) \leq n^{(-1)} \quad \text{for } n \geq 1$$

The first inequality is trivially true since the sequence is positive. For the second inequality, we have:

$$(1/2)*(n^{(-1-n*i)} + n^{(-1)}) \leq n^{(-1)}$$

if and only if

$$n^{(-1-n*i)} \leq n^{(-1)}$$

which is true since  $n^{(-1-n*i)}$  is a complex number

Ask me something...





New Chat



$((1/n^{(1+n*i)})+(1/n^{(0+n*i)}))/2$  respect the squeeze theorem



6/25/2023, 5:16:42 PM

To determine whether the sequence  $((1/n^{(1+n*i)})+(1/n^{(0+n*i)}))/2$  satisfies the squeeze theorem, we need to find two other sequences that converge to the same limit and "squeeze" the original sequence between them.

First, we can simplify the expression:

$$((1/n^{(1+n*i)})+(1/n^{(0+n*i)}))/2 = (1/2)*(n^{(-1-n*i)} + n^{(-1)})$$

Now, we can find two other sequences that converge to the same limit as  $(1/2)*(n^{(-1-n*i)} + n^{(-1)})$  and "squeeze" the original sequence between them. One possible choice is:

- Lower bound: 0
- Upper bound:  $n^{(-1)}$

To show that these bounds work, we need to prove two inequalities:

$$0 \leq (1/2)*(n^{(-1-n*i)} + n^{(-1)}) \leq n^{(-1)} \quad \text{for } n \geq 1$$

The first inequality is trivially true since the sequence is positive. For the second inequality we





New Chat

two other series that converge to the same limit and "squeeze" the original series between them.

We can start by considering the absolute value of the series:

$$\sum |1/n^{(1-n*i)}| = \sum 1/n^{\text{Re}(1-n*i)}$$

Since  $\text{Re}(1-n*i) = 1$ , we have:

$$\sum |1/n^{(1-n*i)}| = \sum 1/n$$

Now, we can find two other series that converge to the same limit as  $\sum 1/n$  and "squeeze" the original series between them. One possible choice is:

- Lower bound: 0
- Upper bound:  $\sum 1/n$

To show that these bounds work, we need to prove two inequalities:

$$0 \leq \sum 1/n^{(1-n*i)} \leq \sum 1/n \quad \text{for } n \geq 1$$

The first inequality is trivially true since the series is positive. For the second inequality, we have:

$$\sum 1/n^{(1-n*i)} = \sum |1/n^{(1-n*i)}| \leq \sum 1/n$$

since  $|1/n^{(1-n*i)}| = 1/n$  is a real number. Therefore, the series  $\sum 1/n^{(1-n*i)}$  is bounded between 0 and



## New Chat

Now, we can find two other series that converge to the same limit as  $\sum 1/n$  and "squeeze" the original series between them. One possible choice is:

- Lower bound: 0
- Upper bound:  $\sum 1/n$

To show that these bounds work, we need to prove two inequalities:

$$0 \leq \sum 1/n^{(1-n*i)} \leq \sum 1/n \quad \text{for } n \geq 1$$

The first inequality is trivially true since the series is positive. For the second inequality, we have:

$$\sum 1/n^{(1-n*i)} = \sum |1/n^{(1-n*i)}| \leq \sum 1/n$$

since  $|1/n^{(1-n*i)}| = 1/n$  is a real number. Therefore, the series  $\sum 1/n^{(1-n*i)}$  is bounded between 0 and  $\sum 1/n$ , which both converge to infinity as  $n$  goes to infinity. By the squeeze theorem, we cannot conclude whether  $\sum 1/n^{(1-n*i)}$  converges or diverges.



6/25/2023, 6:13:32 PM



Sum  $1/n^{(1/2-n*i)}$  respect the squeeze theorem



New Chat

6/25/2023, 6:13:32 PM



Sum  $1/n^{(1/2-n*i)}$  respect the squeeze theorem



6/25/2023, 6:13:45 PM

To determine whether the series  $\sum 1/n^{(1/2-n*i)}$  converges by the squeeze theorem, we need to find two other series that converge to the same limit and "squeeze" the original series between them.

We can start by considering the absolute value of the series:

$$\sum |1/n^{(1/2-n*i)}| = \sum 1/n^{\text{Re}(1/2-n*i)}$$

Since  $\text{Re}(1/2-n*i) = 1/2$ , we have:

$$\sum |1/n^{(1/2-n*i)}| = \sum 1/n^{(1/2)}$$

Now, we can find two other series that converge to the same limit as  $\sum 1/n^{(1/2)}$  and "squeeze" the original series between them. One possible choice is:

- Lower bound: 0
- Upper bound:  $\sum 1/n^{(1/2)}$

To show that these bounds work, we need to prove two inequalities:



New Chat

$$\sum |1/n^{(1/2-n*i)}| = \sum 1/n^{\text{Re}(1/2-n*i)}$$

Since  $\text{Re}(1/2-n*i) = 1/2$ , we have:

$$\sum |1/n^{(1/2-n*i)}| = \sum 1/n^{(1/2)}$$

Now, we can find two other series that converge to the same limit as  $\sum 1/n^{(1/2)}$  and "squeeze" the original series between them. One possible choice is:

- Lower bound: 0
- Upper bound:  $\sum 1/n^{(1/2)}$

To show that these bounds work, we need to prove two inequalities:

$$0 \leq \sum 1/n^{(1/2-n*i)} \leq \sum 1/n^{(1/2)} \quad \text{for } n \geq 1$$

The first inequality is trivially true since the series is positive. For the second inequality, we have:

$$\sum 1/n^{(1/2-n*i)} = \sum |1/n^{(1/2-n*i)}| \leq \sum 1/n^{(1/2)}$$

since  $|1/n^{(1/2-n*i)}| = 1/n^{(1/2)}$  is a real number. Therefore, the series  $\sum 1/n^{(1/2-n*i)}$  is bounded between 0 and  $\sum 1/n^{(1/2)}$ , which both converge to a finite value as  $n$  goes to infinity. By the squeeze theorem, we conclude that  $\sum 1/n^{(1/2-n*i)}$  also converges to a finite value as  $n$  goes to infinity.



Ask me something...



13:34



VoLTE



4G


$$(((1/(98)^{(0+98*i)})+(1/(98)^{(0+98*i)}))/2$$


Input

$$\frac{1}{2} \left( \frac{1}{98^{0+98i}} + \frac{1}{98^{0+98i}} \right)$$



Exact result



$$98^{-98i}$$

Decimal approximation



$$-0.996876113524306678395180533963557851242... + 0.0789811008069248397206262812897151822837... i$$

(using the principal branch of the logarithm for complex exponentiation)

 $+$   $-$   $*$   $/$   $^$   $=$   $($   $)$   $\$$   $\%$ 

1 2 3 4 5 6 7 8 9 0



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$$\})^{(1/2+98*i)))+(1/(98)^{(1/2+98*i)))/2$$


An attempt was made to fix mismatched parentheses, brackets, or braces.

Assuming  $i$  is the imaginary unit ...



Input

$$\frac{1}{2} \left( \frac{1}{98^{1/2+98i}} + \frac{1}{98^{1/2+98i}} \right)$$



Exact result



$$98^{-1/2-98i}$$

Decimal approximation



$$-0.10069969426798969024701612111133279577... + 0.0079782959951649792505397641345773257937... i$$

(using the principal branch of the logarithm for complex exponentiation)

More digits

Property



13:37


$$1/(98)^{(1+98i)} + (1/(98)^{(1+98i)})/2$$


An attempt was made to fix mismatched parentheses, brackets, or braces.

Assuming  $i$  is the imaginary unit ...



Input

$$\frac{1}{2} \left( \frac{1}{98^{1+98i}} + \frac{1}{98^{1+98i}} \right)$$



Exact result



$$98^{-1-98i}$$

Decimal approximation



$$-0.01017220524004394569791000544860773317... + 0.0008059296000706616298023089927521957375... i$$

(using the principal branch of the logarithm for complex exponentiation)

More digits

Property

13:48


$$/2+980*i))*(1/(980)^{(1/2+980*i))^{-1}}$$


An attempt was made to fix mismatched parentheses, brackets, or braces.

Assuming  $i$  is the imaginary unit ...



Input

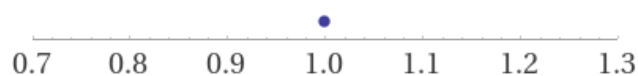
$$\frac{1}{980^{1/2+980i}}$$
$$\frac{1}{980^{1/2+980i}}$$



Exact result

1

Number line



Number name

one

Visual representation

13:49



$$i)^{(1+980i)} \cdot (1/(980)^{(1+980i)})^{-1}$$


An attempt was made to fix mismatched parentheses, brackets, or braces.

Assuming  $i$  is the imaginary unit ...



Input

$$\frac{1}{980^{1+980i}}$$

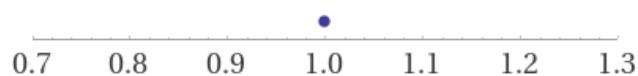
$$\frac{1}{980^{1+980i}}$$



Result

1

Number line



Number name

one

Visual representation

13:49


$$i)^{(1+980i)} \cdot (1/(980)^{(1+980i)})^{-1}$$


An attempt was made to fix mismatched parentheses, brackets, or braces.

Assuming  $i$  is the imaginary unit ...



Input

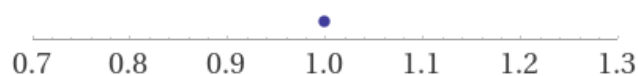
$$\frac{1}{980^{1+980i}}$$
$$\frac{1}{980^{1+980i}}$$



Result

1

Number line



Number name

one

Visual representation

13:50



$$i)^{(0+980i)} * (1/(980)^{(0+980i)})^{-1}$$


An attempt was made to fix mismatched parentheses, brackets, or braces.

Assuming  $i$  is the imaginary unit ...



Input

$$\frac{1}{980^{0+980i}}$$

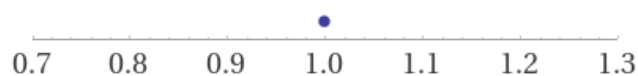
$$\frac{1}{980^{0+980i}}$$



Result

1

Number line



Number name

one

Visual representation

$$\frac{(0+980i) \cdot (1/(980)^{(0+980i)})^{-1}}{2}$$


An attempt was made to fix mismatched parentheses, brackets, or braces.

Assuming  $i$  is the imaginary unit ...



Input

$$\frac{1}{2} \times \frac{\frac{1}{980^{0+980i}}}{\frac{1}{980^{0+980i}}}$$



Exact result



$$\frac{1}{2}$$

Decimal form



0.5

(using the principal branch of the logarithm for complex exponentiation)

Number line



13:55



**WolframAlpha**


$$(((1/(980*980))^{(1+980*980*i)}))$$


An attempt was made to fix mismatched parentheses, brackets, or braces.

Assuming  $i$  is the imaginary unit ...



Input

$$\frac{1}{(980 \times 980)^{1+980 \times 980 i}}$$



Exact result



$$960400^{-1-960400 i}$$

Decimal approximation



$$1.03501253559439223581915718621620314... \times 10^{-6}$$

+

$$1.13643459540822630597235215818952414... \times 10^{-7} i$$

(using the principal branch of the logarithm for complex exponentiation)

More digits

WolframAlpha computational intelligence.

Input:  $(1/98^{98} (1+98^{98}i))^{-1}$

NATURAL LANGUAGE MATH INPUT EXTENDED KEYBOARD EXAMPLES UPLOAD RANDOM

Assuming  $i$  is the imaginary unit | Use  $i$  as a variable instead

Input:  $\frac{1}{98^{98} (1+98^{98}i)}$

Exact result:  $98^{-9804}i$

Decimal approximation:  $0.105566820268684998549023626682746267033326417473398495994233992...$   
 $-$   
 $0.994412211539238469226711943561005941487730376131407602333596543...$   
 $i$   
 (using the principal branch of the logarithm for complex exponentiation)

Property:  $98^{-9804}i$  is a transcendental number

Start coding >>

Learn the Wolfram Language — the language that built Wolfram|Alpha.

WolframAlpha computational intelligence.

Input:  $1/98^{98} (1+98^{98}i)$

NATURAL LANGUAGE MATH INPUT EXTENDED KEYBOARD EXAMPLES UPLOAD RANDOM

Assuming  $i$  is the imaginary unit | Use  $i$  as a variable instead

Input:  $\frac{1}{98^{98} (1+98^{98}i)}$

Exact result:  $98^{9604}i$

Decimal approximation:  $0.105566820268684998549023626682746267033326417473398495994233992...$   
 $+$   
 $0.994412211539238469226711943561005941487730376131407602333596543...$   
 $i$   
 (using the principal branch of the logarithm for complex exponentiation)

Property:  $98^{9604}i$  is a transcendental number

Updated

Don't do just one calculation. Do it all.

Wolfram|Alpha NOTEBOOK EDITION

See What's New



13:56



$$(((1/(980 \times 980))^{(1+980 \times 980 i)})^{-1})$$


An attempt was made to fix mismatched parentheses, brackets, or braces.

Assuming  $i$  is the imaginary unit ...



Input

$$\frac{1}{\frac{1}{(980 \times 980)^{1+980 \times 980 i}}}$$



Exact result



$$960400^{1+960400 i}$$

Decimal approximation



954662.608033134072870802106601016658342003...

—

104821.108672703014670331547102130031665013...  $i$

(using the principal branch of the logarithm for complex exponentiation)

More digits

14:09


$$(1/(98*98)^{(0+98*98*i)})$$


$$\frac{1}{(98 \times 98)^{0+98 \times 98 i}}$$



Exact result



$$9604^{-9604 i}$$

Decimal approximation



$$-0.9777112929167183163415165896143636541380... - 0.2099538704170967080649670055206800086410... i$$

(using the principal branch of the logarithm for complex exponentiation)

More digits

Property

 $9604^{-9604 i}$  is a transcendental number

Alternate complex forms

$$\cos(9604 \log(9604)) - \sin(9604 \log(9604)) i$$

Approximate form

14:21



$$(1/(98*98)^{-1+98*98*i})^{-1}$$
Assuming  $i$  is the imaginary unit ...

Input

$$\frac{1}{\frac{1}{(98 \times 98)^{-1+98 \times 98 i}}}$$



Exact result



$$9604^{-1+9604 i}$$

Decimal approximation



$$-0.000101802508633560840935184984341353983... + 0.0000218610860492603819309628285631695136... i$$

(using the principal branch of the logarithm for complex exponentiation)

More digits

Property

 $9604^{-1+9604 i}$  is a transcendental number

Alternate complex forms



14:22


$$(1/(98*98)^{(1+98*98*i)})$$
Assuming  $i$  is the imaginary unit ...

Input

$$\frac{1}{(98 \times 98)^{1+98 \times 98 i}}$$



Exact result



$$9604^{-1-9604 i}$$

Decimal approximation



$$-0.000101802508633560840935184984341353983... - 0.0000218610860492603819309628285631695136... i$$

(using the principal branch of the logarithm for complex exponentiation)

More digits

Property

 $9604^{-1-9604 i}$  is a transcendental number

Alternate complex forms



14:24


$$(1/(98*98)^{(1/2+98*98*i)})$$
Assuming  $i$  is the imaginary unit ...

Input

$$\frac{1}{(98 \times 98)^{1/2+98 \times 98 i}}$$



Exact result



$$9604^{-1/2-9604 i}$$

Decimal approximation



$-0.0099766458460889624116481284654526903483\dots -$   
 $0.0021423864328275174292343571991906123330\dots i$

(using the principal branch of the logarithm for complex exponentiation)

[More digits](#)

Property

$9604^{-1/2-9604 i}$  is a transcendental number

Alternate complex forms



14:26



$$(1/(98 \times 98)^{(1/2 + 98 \times 98 i)})^{-1}$$
Assuming  $i$  is the imaginary unit ...

Input

$$\frac{1}{(98 \times 98)^{1/2 + 98 \times 98 i}}$$



Exact result



$$9604^{1/2 + 9604 i}$$

Decimal approximation



$$-95.815706705838395001468625782207638105524... + 20.575479300875477390366766541026640846825... i$$

(using the principal branch of the logarithm for complex exponentiation)

More digits

Property

 $9604^{1/2 + 9604 i}$  is a transcendental number

Alternate complex forms

14:27


$$(1/(98*98)^{(0+98*98*i)})$$
Assuming  $i$  is the imaginary unit ...

Input

$$\frac{1}{(98 \times 98)^{0+98 \times 98 i}}$$



Exact result



$$9604^{-9604 i}$$

Decimal approximation



$$-0.9777112929167183163415165896143636541380... - 0.2099538704170967080649670055206800086410... i$$

(using the principal branch of the logarithm for complex exponentiation)

More digits

Property

 $9604^{-9604 i}$  is a transcendental number

Alternate complex forms

14:28



$$(1/(98 \times 98)^{(0+98 \times 98 \times i)})^{-1}$$
Assuming  $i$  is the imaginary unit ...

Input

$$\frac{1}{(98 \times 98)^{0+98 \times 98 i}}$$



Exact result



$$9604^{9604 i}$$

Decimal approximation



$$-0.9777112929167183163415165896143636541380... + 0.2099538704170967080649670055206800086410... i$$

(using the principal branch of the logarithm for complex exponentiation)

More digits

Property

 $9604^{9604 i}$  is a transcendental number

Alternate complex forms



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To determine if the squeeze theorem applies to the equation  $\sin(x) = x$ , we need to find two functions that sandwich  $\sin(x)$  between them and approach the same limit as  $x$  approaches 0.

We know that  $\sin(x)$  is between -1 and 1 for all values of  $x$ , so we can use these bounds to create our two functions.

Let  $f(x) = -x$  and  $g(x) = x$ . Then, we have:

$$f(x) \leq \sin(x) \leq g(x) \text{ for all } x$$

Taking the limit as  $x$  approaches 0, we have:

$$\lim_{x \rightarrow 0} f(x) = \lim_{x \rightarrow 0} (-x) = 0$$


$$\lim_{x \rightarrow 0} g(x) = \lim_{x \rightarrow 0} (x) = 0$$

Since  $f(x) \leq \sin(x) \leq g(x)$  for all  $x$  and  $\lim_{x \rightarrow 0} f(x) = \lim_{x \rightarrow 0} g(x) = 0$ , we can conclude that:

$$\lim_{x \rightarrow 0} \sin(x) = 0$$

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POR 15:56

PTB2 27/06/2023



WolframAlpha computational intelligence.

Input:  $1/98 \times 98^{1/2+98 \times 98 i} / (1/98 \times 98^{1/2+98 \times 98 i})^{-1}$

Assuming  $i$  is the imaginary unit | Use  $i$  as a variable instead

Input:  $\frac{1}{98} \times \frac{98^{1/2+98 \times 98 i}}{1/98^{1/2+98 \times 98 i}}$

Exact result:  $98^{-1+19208 i}$

Decimal approximation:  $-0.00997664584608896241164812846545269034834697948428760581123454... + 0.0021423864328275174292343571991906123307222758761878499224866... i$

Property:  $98^{-1+19208 i}$  is a transcendental number

Step-by-Step Solutions for... Calculus, Algebra, Trigonometry, Equation Solving, Chemistry

Student pricing

WolframAlpha computational intelligence.

Input:  $1/98 \times 98^{1/2+98 \times 98 i} \sin(1/98 \times 98^{1/2+98 \times 98 i})$

Assuming  $i$  is the imaginary unit | Use  $i$  as a variable instead

Input:  $\frac{1}{98} \times 98^{1/2+98 \times 98 i} \sin\left(\frac{1}{98} \times 98^{1/2+98 \times 98 i}\right)$

Exact result:  $98^{-1/2+9604 i} \sin(98^{-1/2+9604 i})$

Decimal approximation:  $-0.00999247691827595108687689925449167268849689964775983339213301... + 0.00214951629370903034754050978093057393705737504799869576718275... i$

Alternate complex forms:  $-0.0099925 + 0.0021495 i$

Step-by-Step Solutions for... Calculus, Algebra, Trigonometry, Equation Solving, Chemistry

Student pricing

Input

$$1/98 \times 98^{1/2 + 98 \times 98 i} - 1/(1/98 \times 98^{1/2 + 98 \times 98 i})$$

Exact result

$$98^{(-1/2 + 9604 i)} - 98^{(1/2 - 9604 i)}$$

Decimal approximation

$-1.03439434351257106292531969004040168672295572074400874685689781... + 9.94462945561951477726075314505851802717820900547973048471155114... i$

(using the principal branch of the logarithm for complex exponentiation)

Property

$98^{(-1/2 + 9604 i)} - 98^{(1/2 - 9604 i)}$  is a transcendental number

Alternate complex forms

$-1.0344 + 9.9446 i$

$\sin(1/98 \times 98^{(1/2 + 98 \times 98 i)}) - 1/(1/98 \times 98^{(1/2 + 98 \times 98 i)})$

Exact result

$\sin(98^{(-1/2 + 9604 i)}) - 98^{(1/2 - 9604 i)}$

Decimal approximation

$-1.03434070028012907526250788954410767200526657376064340287621701... + 9.94479275064199113319481611045144378808454300962498352930411890... i$

(using the principal branch of the logarithm for complex exponentiation)

Alternate complex forms

$-1.0343 + 9.9448 i$

$\sin(1/98 \times 98^{(1/2 + 98 \times 98 i)})$

Exact result

$\sin(98^{(-1/2 + 9604 i)})$

Decimal approximation

$0.010717502443911792435237776682277537261224772970416980546215827... + 0.10061409760449165671447461332280978138288156985716951413510868... i$

(using the principal branch of the logarithm for complex exponentiation)

Alternate complex forms

$0.010718 + 0.100614 i$

$1/98 \times 98^{(1/2 + 98 \times 98 i)}$

Exact result

$98^{(-1/2 + 9604 i)}$

Decimal approximation

$0.010663859211469804772425976185983522543535625987051636565535028... + 0.10045080258201530078041164792988402047654756571191646954254092... i$

(using the principal branch of the logarithm for complex exponentiation)

Property

$98^{(-1/2 + 9604 i)}$  is a transcendental number

Alternate complex forms

$0.010664 + 0.100451 i \rightarrow$  within a certain number of places in the decimals it is approximately equal  $0.010718 + 0.100614 i$  which is  $\sin(1/98 \times 98^{(1/2 + 98 \times 98 i)})$

The above equations in order of appearance reveal that the fact that the numbers expressed by the general form  $1/(n \times n)^{(1/2 + n \times n \times i)}$  respect the squeeze theorem, allows for simple substitution in the numbers of the Riemann zeta function I also respect this theorem, verify that when the number Pi is used as sine of Pi, an infinite result is obtained, together with the fact that when the circumference expressed by  $2\pi r$  tends to the imaginary as was demonstrated at the beginning of this publication, is also repeated in the intersection angles of

imaginary and real numbers in the graph of non-trivial zeros, to this is added the fact that according to the resolution of solve in the last line of the wolfram program when equaled to zero and when uses a number representative of a non-trivial error the result is an infinite complex, which also corroborates the fact that the non-trivial zeros are perpetuated to infinity are only observed when considering the value of  $\frac{1}{2}$  for the value of the real part of the complex number corresponding to the exponent of  $s$  in  $1/n^s$  and which can only be obtained when considering the infinite value of the Riemann zeta function, on the left side of the equation when solving for  $x$ , as well quoted by the text dochat gpt in Portuguese .

When considered the  $x$   $y$  axis and the position of the critical line  $\frac{1}{2}$  on the real axis as the imaginary vs real  $y$  vs  $x$  axis, then we must consider the half way to the position of 1 as being representation of a pythagoric triangle, where the cosine is  $\frac{1}{2}$  and the sin is  $\frac{\sqrt{3}}{2}$  then there is alternate forms of  $x$  to be considered as in a given screen shot above, to be  $x = \frac{2}{3} * (3\pi * n + \pi)$  where there can be taken a relation with the sin of the imaginary value of  $0.81118 i$  plus a given value of sin of  $x$  that will give results of 0.5 referred to the critical line, of  $x$  referring to the prime numbers, numbers that also respect the distribution just like the distributions of prime numbers it self, but with a certain  $\pi$  association as can be seen in the red and blue graphs of the last screen shot. It is of notice that the number subtracted from the sine of  $x$  plus  $\pi$  that needs to be subtracted is 0.02882 that has a sin with a value that is the same number 0.02881 as if sin of  $x$  is equal  $x$ , and that is no coincidence, as it normalizes the relation to 0.5, also shown in the screenshots above (last pages).

In the last 9 screenshots the ai shows that the only form that allows for conclusion that the squeeze theorem applies is to the variant  $\frac{1}{2}$  of the zeta function exponente. To rewrite the text explaining it is redundant, as the texts are well understandable despite being an argument by an AI.

In the last 23 screenshots there are a serie of possible combinations to the exponent of the zeta function and its correlated results whereas there is in some cases numbers that are equal to its inverse, in some cases with a small change to the numbers of the exponente, in such a way that it is possible to establish the following relation:

$$\begin{aligned}
 x^0 &= x^{-0} \\
 x^1 &= x^{-1-1} \\
 x^{\frac{1}{2}+x} &= x^{-\frac{1}{2}+x} \\
 \frac{x^0 + x^1 + x^{-0}x^{-1-1}}{2} &= x^{\frac{1}{2}+x} \\
 &= \frac{2x^0 + 2x^1}{2} = x^{\frac{1}{2}+x} \\
 &= \frac{2 + 2x^1}{x^x} = 2x^{\frac{1}{2}} = \\
 \frac{2 * (1 + x)}{x^x} &= 2x^{\frac{1}{2}} = \\
 2 + 2x &= 2x^{\frac{1}{2}} * x^x = \\
 2x^{\frac{1}{2}} * x^x - 2x &= 2 =
 \end{aligned}$$

$$2x^{2*\frac{1}{2}} - 2x = 2 =$$

$2x - 2x = 2 \Rightarrow x; x = 0 = 1$  for  $\frac{1}{2}$  as exponente, which means that in  $\frac{1}{2}$  as exponente the critical line assumes both values of the exponents 1 and 0 as in the non trivial zeros, but does not represent the position 0 and 1 that are its boundaries in the sequeeze theorem as x tends to infinity and as x approaches zero.

In the last Picture isósceles triangle , if we relate the non trivial zero as the hypotenuse, and the rule distance from the origin as another value as the opposite catheto then it is possible to find the value of the adjacent catheto, if you do that for the first 2 non trivial zeros, is it possible to find the adjacent catheto distance to another non trivial zero far ahead, the ratio repeats it self and respect the angle from the base of that triangle and it is so that there can not be another non trivial zero that lies aside from that angled relation, so it is impossible to have a zero outside the critical line. Another evidence for the proof of the non trivial zero outside of the critical line  $\frac{1}{2}$  is that with the zero exponent and 1 as exponent in the "s" of the  $1/n^s$  portion of the zeta function is that they both have inverse values that are its conjugate and so add up to a real number , being  $\frac{1}{2}$  the mean of the sum of the two it does not give values of conjugates and its sum can give values of imaginary numbers that are essential part of the zeta function to get non trivial zeros.